Application Note

Engineer	**Benjamin Kessler**	
Project:	Reduction of common Mode Currents for Motor bearing Protection	

Devices

- Rogowski Coil – PEM 50mV /A – 2 Turns
- Oscilloscope R&S RTH Handheld

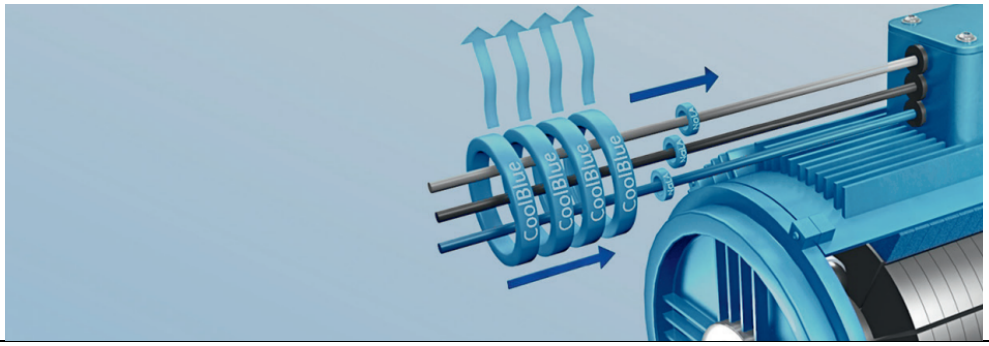
Machine:

- Motor on Underground drilling machine
- System Power: 1,4 Mega Watt

Introduction

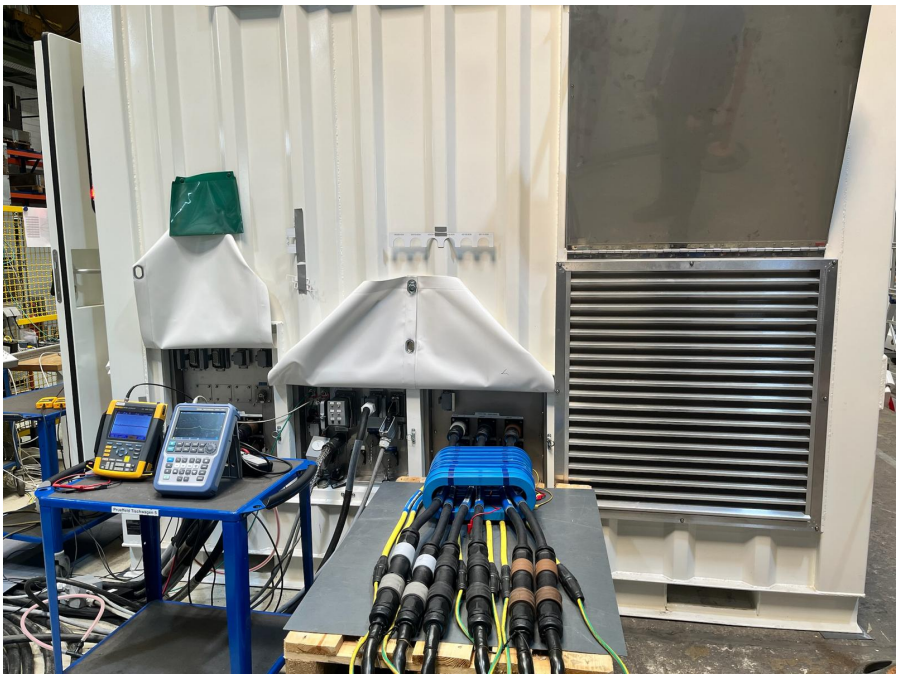
Thanks to the frequency converters (FC) with their constantly improving power electronics and control technology, modern drive systems have developed into a complex system. The possibility to switch high voltage with a few µs results in increasingly efficient frequency converters, however the electromagnetic interference also increases. A good circuit board layout and a good harmonization of hardware and software are essential EMC measures, although additional hardware must usually also be used. On the mains side, the high-frequency interference is usually suppressed with a mains filter to ensure mains cleanliness. Toward the motor/generator, very often only shielded cables are used. If connected appropriately for EMC (low impedance, etc.), they mostly reliably shield the radiated interference from other systems, but do not protect the motor/generator from line-conducted interference. The high-frequency asymmetrical interference flows from the FC to the motor/generator. For the frequencies in the high MHz range, the capacity of the motor/generator bearing is a low impedance return via ground. This described phenomenon results in motor/generator bearing currents that, in serious cases, can result in mechanical damage to the bearings. Even if this is not the case, the bearings, and thus also the lubricants, are also heated by the currents, which results in faster aging and higher maintenance costs.

CoolBlue® and NaLA® have established themselves as a low-cost and maintenance-free solution in many applications due to their good absorption of the interference and simple installation. We will be happy to support you with an on-site measurement, in combating/reducing/suppressing interference.



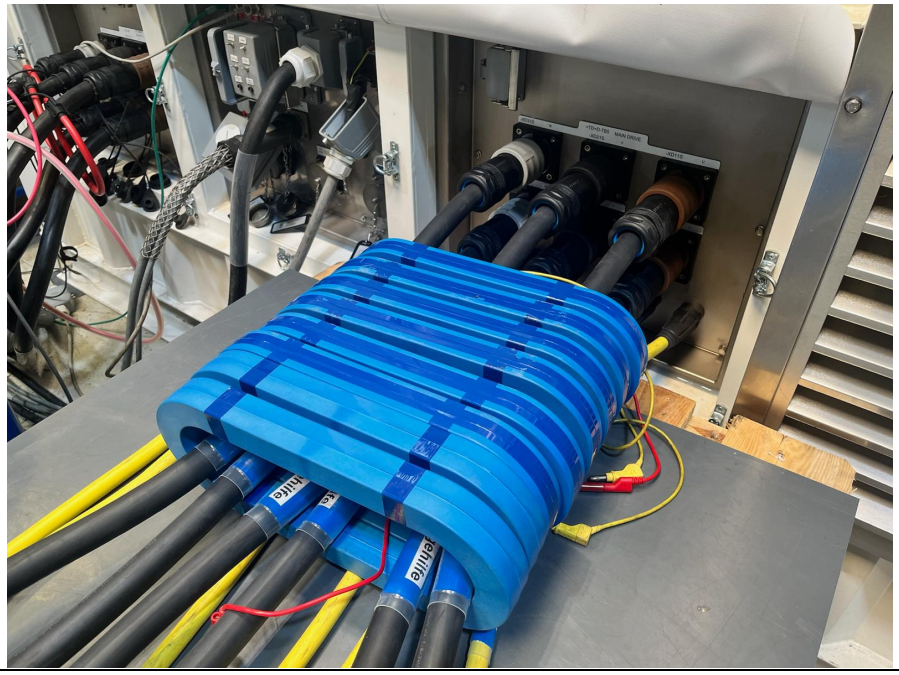
Measuring Setup

The Cores are installed directly at Inverter Output of the Installation



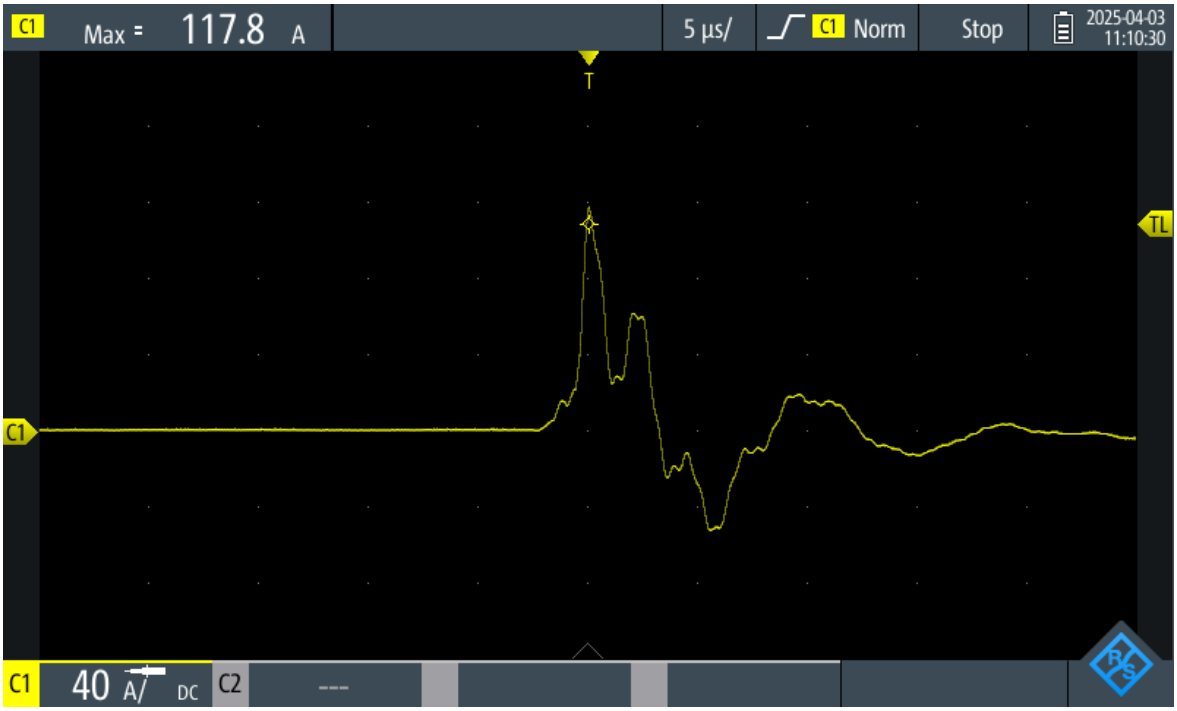
The Coolblue Cores are installed over the Motorwires on an unshielded place
The following Cores are used:

- 6x **M-284** and
- 2x **M-1618**

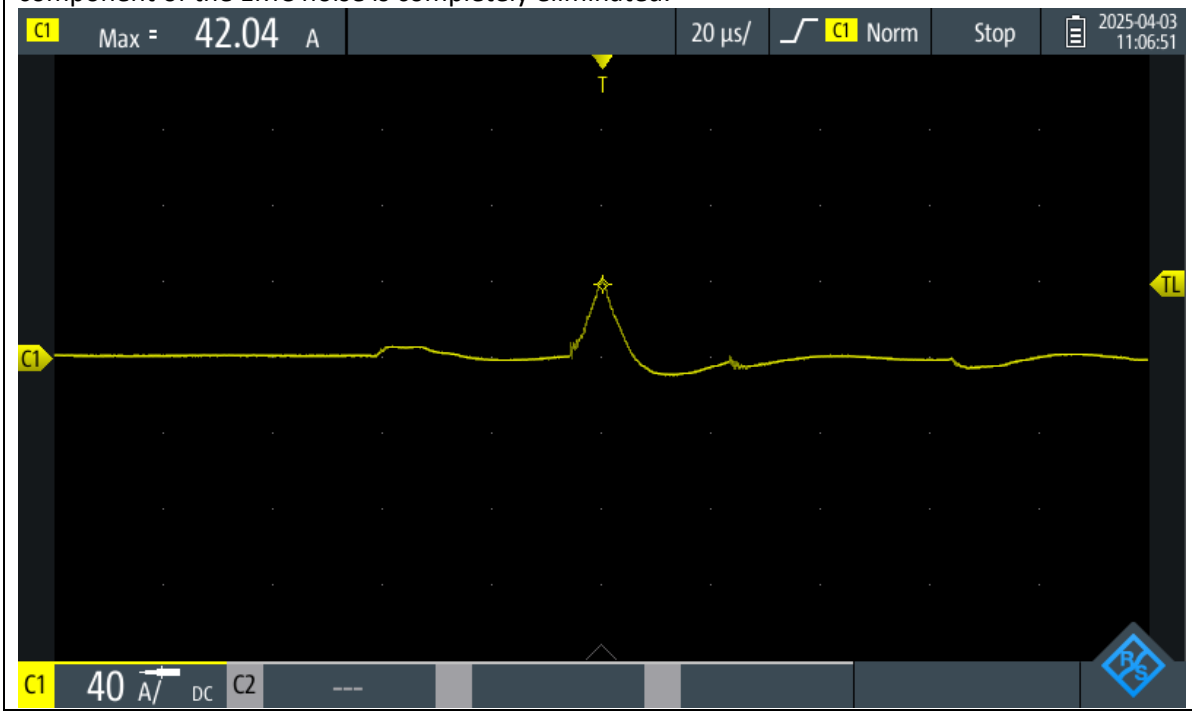


Measurement Results

The common Mode peak current is measured to 117,8A, what can create fast derating in the Motor-bearings what can lead to fast failure of the complete setup



By Installing Coolblue Cores the Peak Current can be reduced by 64% and the high frequency component of the EMC noise is completely eliminated.



Conclusion

The effective Reduction of Common Mode noise will protect the Motor Bearings against fast derating and damages because of Currents running through the bearing.

The Lifetime of the Bearings are extended to the standard Lifetime what is specified by Bearing Manufacturer.

The Cores can be selected by System Power and Cable Length in the following link:
https://www.magnetec.de/storage/2022/10/CoolBlue-Datasheet.pdf

A guide for installation can be found in the following link
https://www.magnetec.de/storage/2023/03/Installation_CoolBlueNaLA_2303.pdf

Getting in Contact for technical questions:

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